Mental Models and the Anaesthetist

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Mental models, to put in simple words, are the representation of how anything works (from Smartphone to complex financial systems). We cannot carry the complexity of the world we inhabit, and hence simplify it through mental models into easily understandable concepts. This helps us reason, judge and take better decisions. Each field of study has a set of most important principles on which the foundations of that discipline are built on. They form the key mental models which should be incorporated for better decision making.

The quality of thinking and decision making is proportional to the number of good quality mental models we carry in our head. This equates to more tools in our mental toolbox and hence more options to deal with a certain problem. Many of us consider ourselves specialists. Instead of a collection of mental models, we have a few from our field. A psychologist thinks in incentives, an engineer in systems and a mathematician in algorithms. They, as specialists are limited to thinking in one way to solve a problem. By incorporating these three disciplines in our head, we can tackle a problem in a multi-dimensional way. This decreases the blind spots and improves decision quality.

Just carrying few models in our head will not make a difference. Arranging them in a nice latticework is paramount. Learning should take place with this framework in the head and we should make it a lifelong project to acquire more models as we go along.

As doctors, in general, we are limited to our field and resist learning mental models from other unrelated fields. However, there are some general mental models which can be learnt easily such as 'circle of competence', 'map is not the territory', 'first principles thinking', 'thought experiment', 'second order thinking' and 'inversion'.

I would like to highlight a few models with examples:

- Model of 'Circle of Competence' teaches us to know the perimeter of things that we know how to perform with high confidence (Eg: Intubation in a patient with easy airway for consultant anaesthesiologist). We have to stay within this circle and try to expand it by training. Outside this inner circle lies a dangerous zone wherein "we think we know" and trying to do things here leads to disaster (Eg: Trying to use a new airway tool in a difficult airway situation without appropriate training).

- Model of 'First Principles Thinking'. Unless we understand the basic concepts of 'why' we do certain things we cannot execute high quality care for our patients. An example is not understanding the physiological basis of preoxygenation and just concentrating on the time prescribed in the text books for the same. This might lead to inadequate preoxygenation in certain group of patients. This model also highlights the need to impart first principles concepts during the training period with emphasis on understanding 'why' we do rather than 'what and how' we do.

- Model of 'Compounding'. This is an important model of the finance world and describes a process by which interest added to fixed sum earns interest and the newly added interest earns more interest and this continues ad infinitum. This is an exponential process and can be applied to non-financial aspects. An example is health of an individual. A regular exercise program and good diet regimen practised on a daily basis leads to better health as the years progress. Another example is learning. Reading 10-20 pages a day has a compounding effect on learning.

- Model of 'Map is not the territory'. A map is an imperfect representation of reality. They are reductions of what they represent. They also represent a snapshot of a point of time and hence may depict something that no longer exists. A difficult airway algorithm is a map. However, every scenario of difficult airway rarely behaves as the algorithm suggests (not mentioning the emotions and mental trauma omitted in the guideline). A simulation training program probably narrows this gap by bringing reality closer to a learning mind and in turn circumventing the limitations of just a 'map'.

Having explored a few models in brief, it is important to embark on a journey to learn and internalise more models (Table 1). 'The more the merrier' aphorism will not be wrong if we build a strong latticework of models to understand the world around us and in turn improve the decision making skills. This will make us better clinicians, better human beings and definitely improve patient care.

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Discipline	Psychology	Economics	Statistics	Accounting
Table 1: Few examples of mental models from other disciplines				
Models	1. Anchoring	1. Comparative Advantage	1. Bayes Theorem	1. Depreciation
	2. Association	2. Diminishing Marginal Utility	2. Central Limit Theorem	2. Dupont Ratio Analysis
	3. Authority	3. Marginal Cost	3. Correlation and Causation	3. Earnings Yield
	4. Availability	4. Opportunity Cost	4. How To Lie With Statistics	4. Manias, Panics, and Crashes
	5. Commitment and Consistency	5. Prisoner's Dilemma	5. Law of Small Numbers	5. Mr Market
	6. Contrast Effects	6. Scarcity	6. Measures Of Central Tendency	6. Owner Earnings
	7. Deprival Super Reaction Syndrome	7. Supply and Demand	7. Regression Analysis	7. Return on Invested Capital
	8. Do-Say Something Syndrome	8. Tragedy of the Commons		
	9. Envy and Jealousy			
	10. Hindsight Bias			
	11. Ideological bias			
	12. Incentive Caused Bias			
	13. Incentives			
	14. Liking			
	15. Lollapalooza Effect			
	16. Man with a hammer syndrome			
	17. Reciprocation			
	18. Regression to the mean			
	19. Self Deception and Denial			
	20. Social Proof			
	21. Status Quo Bias			
	22. Stress			
	23. Use it or lose it			

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